Learning
through
Multimedia
Simulations

The study of Geographical Information Systems is a new and rapidly growing field which plays a very important role in modern geography. GIS software allows the user to display, manipulate and analyse maps or any other spatial information, such as satellite images, plots of travelling time or soil types.

Dr. Jonathan Raper is a Lecturer in GIS at Birkbeck College, University of London as well as Director of Birkbeck's Mapping Centre where students have access to a laboratory full of Apple™ Macintosh™ systems connected to mainframe computers in "one of the most advanced mapping facilities in the world", according to Raper.

GIS systems can integrate maps with relevant databases, so while looking at a map of a large city you could call up detailed information about land use, applications for planning permission or utilities such as sewage and power lines. You might browse through some maps, form a theory about the relationship between two variables, and test it by superimposing two plots and print out the results.

The GIS system at Birkbeck combines the advantages of powerful mainframe computers with the low cost, ease of use and superior graphics capabilities of the Apple Macintosh.

Challenge of teaching diverse groups

A wide range range of people have a need to understand the capabilities of GIS systems explains Raper. "From civil engineers to executives of haulage companies, from government statisticians to town planners - all have a need to analyse and manage information in a spatial context." The challenge facing Raper was how to teach these diverse groups of people the complexities of GIS systems. He needed an environment that was easy to develop in and could handle a wide variety of media - from graphics and animations to sound and visual effects.

Back in 1988, a Sunday afternoons' experimentation with an Apple Macintosh and HyperCard™ convinced Raper and his colleague Nick Green, that they had found the right environment for developing a GIS teaching programme or "Tutor", which became known as GIST. Its development took place over the next six months and it proved its utility not only with newcomers to the subject but also as a reference tool for people with existing knowledge. GIST has been used not only in Birkbeck's undergraduate courses for mature students, but also with 180 students from diverse backgrounds who have taken short courses in the department.

Lecturers have time to deal with individuals

A typical Birkbeck teaching session begins with an hour's lecture, illustrated by GIST material presented by overhead projector; The lecturer takes the opportunity to point out various routes through the material, bearing in mind that some students are computer programmers with little knowledge of geography, whereas others may be cartographers who lack computing experience. There follows an hour and a half of 'hands-on' exploration using the Tutor; Up to 12 students

each work with an Apple Macintosh, while two instructors circulate. "Having GIST to present the basic material frees us to do what we should be doing – dealing with individual problems", says Raper. At the end of a session follow-up work is suggested and any general problems explained.

Movement easily communicated with animations

"HyperCard animation capabilities are especially suited to showing the gradual transition from one map projection to another, with smooth changes and student control over the pace. It's hard to imagine a more effective way of showing the distortion of areas near the poles when a spherical surface is forced onto a cylinder. But there are other advantages", says Raper: "Animation gives the presentation a change of pace and helps to motivate. It expands their span of attention. Sometimes a student sits back in his chair and the look on his face says it all." Animation is used for other purposes too: students can fly around the volcanic crater of Mount St Helen's and compare the visual impact of a dynamic perspective view with that of a traditional contour map.

Sound provides important feedback to the user

As well as making extensive use of graphics, text and animation, the use of sound in GIST is also interesting. Raper explains; "Sound provides a very important communication channel but we consciously avoided the use of

sound as a reward or punishment for right/wrong answers". Mature students working in a quiet room are sensitive to their mistakes being broadcast, and fear of failure inhibits experimentation and hence learning. Instead, sound is used to cue stages in sustained processes, such as the confirmation of successful input of each point on a digitised map, with different tones for lines of different kinds.

Advantages over alternative teaching methods

One reason for GIST's success has been the laborious and expensive nature of the alternative methods of teaching this material. Using the mainframe with up to 12 students at a time put an incredible load on the mainframe and led to unacceptably slow response times. Using computer output plotted on paper involved manipulating up to 25 maps side by side – a cumbersome process which made juxtaposition difficult and slow.

"GIST has proved a convenient and attractive learning tool which offers not only a massive increase in quality over previous methods, but also a more cost-effective use of staff time" concludes Raper.

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